

Specification**"Device and Method for Searching and Processing of Data in a Mass Storage"**

The invention relates to a device and a method for searching and processing of data in a mass storage.

Search engines are known from the Internet, which after one enters a search term, list the pages connected to the search term from a large number of Internet pages. Such a search in a large quantity of data not normally assembled manually by a single person is necessary to find the desired information, since it is not possible to search through the entire quantity of data by hand.

Furthermore, devices are known with a sufficiently large hard disk, that can save large quantities of audio and video transmissions or text files. For example, one can store about 1000 different pieces of music on a hard disk with a storage capacity 5 GB. Meanwhile, hard disks with a storage capacity of 100 GB are known. In the foreseeable future, the storage capacity of hard disks might be increased by several orders of magnitude. In order to find desired data on hard disks with capacities of such orders of magnitude, one requires optimized search engines. However, it should be possible for a user to carry such devices along with him in a mobile fashion.

Thus, such devices should be as small, light, and handy as possible. However, the use of such devices is often complicated. For example, palmtops are known, which basically represent miniaturized laptops. Despite their small size, they have to be placed on a surface in order to work, which is often done on the knees. In order to enter text as fast as possible, the keyboard should be operated with both hands, so that the device cannot be grasped firmly. Thus, the device is very unstable in its positioning. Additional problems are caused by the miniaturized keyboard, since one often depresses several keys at the same time with one finger.

Moreover, devices are known which have a keyboard and whose keys are typed with a stylus. The keyboard and its space requirement on the device have thus been reduced, but the handling is not simplified, since once again an entry is only possible with both hands.

A keyboard with a smaller number of keys is known from mobile or wireless telephones, but each key is assigned several meanings. In this way, single-hand operation of a device be-

comes possible. However, the handling of the device itself is more difficult, since it is not immediately evident how to select the different meanings of the keys. In particular, in order to operate the device without error, the device must report back the meaning assigned to the last key stroke. For this, such devices require a screen, which needs to be as large as possible so that what is written on the screen is easily legible.

Besides entry by key typing, voice entry is also known, but this leads to wrong results if one does not speak clearly, and there is also character recognition of text written by hand on a screen, but this also produces wrong results if the writing is shaky.

A single-key operation is known from the computer mouse. However, this is coupled with a two-dimensional motion, for which a smooth surface is required. Furthermore, an especially large screen is necessary in order to display the different menu items without problem on the screen. The text becomes illegible on smaller screens.

The Morse key enables text to be entered using a single key switch. In most instances, the Morse keying is used for wireless transmission of text from a sender to a remote receiver. The document US 6,418,323 B1 discloses a mobile telephone which is fitted with a Morse key so that one can hold private telephone conversations even in public by relaying the desired text via Morse code to the user of the second mobile telephone. A setting up and testing of the operating module of an electronically controllable device by means of a Morse key is known from DE 197 56 042 A1. Here, the device being tested issues on demand the current sending or receiving frequency, for example, by means of Morse code.

The problem of the invention is to simplify the searching and processing of data in a mass storage.

The problem is solved according to the invention by a device for searching and processing of data in a mass storage according to Claims 1 and 23, and a method for searching and processing of data in a mass storage according to Claims 12 and 20.

The device according to the invention for searching and processing of data in a mass storage comprises a housing with an acoustic and/or optical output unit and a search function, wherein a key unit is fashioned on the housing for entry of Morse code or Morse-like symbols in two input modes, the first input mode being designed for entry of text and the second input mode for entry of control commands. Thanks to the use of Morse code or Morse-like symbols for the entry of text, the number of required keys is significantly reduced, which represents in particular a sub-

stantial space savings as compared to a keyboard for text entry. Since two entry modes are needed during the searching and processing of data, namely, the entry of the actual text and the entry of control commands, the separation according to the invention of the different inputs into two entry modes helps avoid uncertainty as to which entry mode the device is using. In one advantageous embodiment of the invention, the key unit consists of two keys, one key being designed for entry of text and the second key for entry of control commands. Thus, one can clearly distinguish whether the term "execution" means to search within data or whether this term is an instruction to perform a search, for example.

Another advantage of the entry of control commands by means of Morse code or Morse-like symbols is that terms of normal speech can be used as command words and no code words are required. By Morse-like symbols is also meant different relations between short and long key operations than those prescribed by Morse code, and a different rhythmic translation of the alphabet into sequences of long and short key operations or sequences of light and firm key pressures.

In order to operate the device for searching and processing of data in a mass storage with a single key, both keys are in one element, for example, a wheel which can lock into two positions, a sliding controller, which can be moved into two positions, or a rocker which can be flipped into two positions, and the element can be operated in both positions as a key unit for entry of Morse symbols. As an alternative, both key functions are combined in a single key unit, and one can switch between the two entry modes by means of a particular Morse symbol or Morse-like symbol. Once again, the key unit can be fitted with a flipping, sliding, or turning function in order to enable a switching between the two entry modes by a flipping, sliding, or turning forward and back again.

The text entered by means of the first key consists primarily of search terms to define the data search. By search terms is meant not only complete words, but also individual syllables or combinations of letters which occur in the indicated sequence in the search term, such as all the consonants. Also, however, the entering of messages, addresses, correspondence, passwords, or other written text, which should be taken up without interpretation by the mass storage, occurs by means of Morse symbols or Morse-like symbols via the first key. When entering combinations of letters from different words, which are joined by "and," for example, one must define a blank symbol in order to coordinate the letters with the different words, for example, using an

especially long pause or a special symbol. A blank symbol preferably always defines a linking of the terms or sequences of letters with “and” preferably in search mode.

In one advantageous embodiment of the invention, each of the two keys is arranged at one of the two long sides of the housing. This allows operation of the first key with the thumb and the second key with the index finger, while the housing can be held in the palm. One's view of the first screen remains free. Such an arrangement of the two keys allows both right- and left-handed people to operate the device equally.

The output unit can consist, for example, of a light-emitting diode, an integrated loud-speaker, or a connection for a headphone. A device for acoustic output of information on search results offers the advantage of stating the number of results found, so as to inform the user as quickly as possible whether his search should possibly be limited by additional search terms. The mechanical output unit can be an additional key unit, or one of the two key units for entry of search terms or commands can serve, being able to move under electronic control at the rhythm of Morse code or Morse-like symbols, and a user can feel the movement. Such an output unit is totally noise-free and can also be used when talking to others without the conversation being disturbed by acoustic output from the device or looking at the screen or the light diodes. A screen is especially preferred as the output device, since this enables a quick glance at the text.

In an especially advantageous embodiment of the invention, a screen is arranged on the front and back side of the housing. On the one hand, it is possible to display larger portions of result lists in this way. But the screens can also be assigned different functions, e.g., the display of two different searches or the display of a search result on one screen and a written text on the second screen. A second screen, furthermore, is advantageous when several people want to look at the screen at the same time, for example, to view picture files such as digital photos or the like. If the photo is displayed on both screens at the same time, several people can look at the screen from different positions.

In one advantageous embodiment of the invention, a wheel is additionally formed on the housing for moving the screen contents. This facilitates the reading of the search results or the scrolling in written text.

Preferably, the text of the search terms entered by means of the Morse symbols is visible on the screen in the top line. Thus, the user has direct control over his symbols entered, making possible a correction if necessary.

Preferably the mass storage is arranged in a portable storage unit. An entry by means of a Morse key is especially space-saving for portable devices, which need to be as small and handy as possible. Thanks to the entry of text and control commands by means of a single key unit, a portable device does not have to be set down on a surface in order to be used.

In the method according to the invention for searching and processing of data in a mass storage, Morse symbols or Morse-like symbols are entered in two entry modes via a key unit, text being entered in the first mode and control commands in the second mode.

In one advantageous embodiment of the method for searching for data in a mass storage, the entire list of available data is shown on the screen in the beginning, and even the entry of a single letter as the search term will alter the sequence of data in the list. With such a search method, often the mere entering of a syllable or a sequence of letters occurring in that sequence in the search term, or all the occurring consonants of the search term, will be enough to filter out the desired data. Thus, the search method is especially optimized in time.

Preferably, the control commands can be entered in any given language. If the individual actions of the device are associated with certain terms, the entering of terms such as "enter," "execute" or "execution" will initiate the starting of a search. Thus, the control commands can be entered unambiguously, which facilitates the operation of the device according to the invention.

Preferably, one can enter rhythms as search terms, corresponding not to any text or letters but rather to a melody of a particular song. This facilitates the searching for particular music titles when the user knows only the melody, but not the particular title of a piece of music.

Furthermore, in one advantageous embodiment of the invention passwords can be entered as text, which consist of a rhythm. This allows for an extensive protection against unauthorized access to password-protected files, since such passwords are not listed in any dictionary or lexicon.

Advantageously, the user can be identified by means of the pattern of Morse symbols or Morse-like symbols.

In an alternative method of the invention for searching and processing of data in a mass storage, Morse symbols or Morse-like symbols are entered in at least one entry mode designed for entry of text via a key unit, and search terms are entered to carry out a search in one entry mode, and at the start of the search the entire list of data present on the mass storage is indicated on a screen and merely the entry of one letter as the search term correspondingly alters the se-

quence of data in the list or hides those data not corresponding to the search term.

In such a search method, it is often sufficient to merely enter one syllable or one sequence of letters occurring in that sequence in the search term, or all the consonants occurring in the search term, to filter out the unwanted data. Thus, the search method is especially optimized in time.

By Morse-like symbols can also be understood other relations between short and long key operations than those prescribed by Morse code, a different rhythmic translation of the alphabet into sequences of long and short key operations, or sequences of light and firm key pressures.

The search method preferably requires only a single entry mode. Advantageously, therefore, the key unit consists of only a single key.

Furthermore, however, additional entry modes can be provided on the key unit for the complete operation of the device, e.g., for entry of control commands, as described in the first method of the invention. Nor is it excluded to provide more than two entry modes, e.g., for simultaneous performance of several searches or entry of control commands on different levels, for which preferably the key unit also has more than two keys and/or a key with more than two operating positions. Possible configurations of the key unit for entry of Morse symbols or Morse-like symbols in two entry modes have already been described for the first device of the invention and can also, of course, be applied to a device for implementation of the alternative method of the invention.

Preferably, one can enter, as search terms, rhythms corresponding not to any text or letters, but rather to a melody of a particular song. This facilitates the searching for particular music titles if the user only knows the melody, but not the particular title of a piece of music.

Advantageously, the user can be identified by means of the pattern of Morse symbols or Morse-like symbols.

The device of the invention for carrying out the alternative method of the invention for searching and processing of data in a mass storage comprises a housing with an acoustic and/or optical output unit and a search function, wherein a key unit is fashioned on the housing for entry of Morse symbols or Morse-like symbols in at least one entry mode, wherein one of the entry modes is designed for entry of text when carrying out a search. Thanks to the use of Morse symbols or Morse-like symbols for entry of text, the number of required keys is significantly reduced, which represents in particular a substantial space savings as compared to a keyboard for

text entry.

In general, a single entry mode is sufficient to perform a search. Advantageously, therefore, the key unit consists of at least one key, which is fashioned to enter Morse symbols or Morse-like symbols in precisely one entry mode, designed for entry of text when performing a search. However, the key unit can also have additional keys which are suitable for additional entries, e.g., for controlling the device, in additional entry modes. The additional keys need not necessarily be suitable for entry of Morse symbols or Morse-like symbols; they can be any known control device based on keys, such as a key pad similar to the familiar key pads of mobile telephones.

The text entered by means of the first key consists primarily of search terms to define the data search. By search terms is meant not only complete words, but also individual syllables or combinations of letters which occur in that sequence in the search term, such as all the consonants. In the case of entering combinations of letters from different words, which are linked by "and" for example, a blank symbol has to be defined in order to assign the letters to the different words, e.g., using an especially long pause or a special symbol. A blank symbol preferably always defines a linkage of the terms of the letter sequences by "and" in the search mode.

The output unit can consist, for example, of a light-emitting diode, an integrated loudspeaker, or a connection for a headphone. A device for acoustic output of information on search results offers the advantage of stating the number of results found, so as to inform the user as quickly as possible whether his search should possibly be limited by additional search terms. The mechanical output unit can be an additional key unit, or one of the two key units for entry of search terms or commands can serve, being able to move under electronic control at the rhythm of Morse code or Morse-like symbols, and a user can feel the movement. Such an output unit is totally noise-free and can also be used when talking to others without the conversation being disturbed by acoustic output from the device or looking at the screen or the light diodes. A screen is especially preferred as the output device, since this enables a quick glance at the text.

In an especially advantageous embodiment of the invention, a screen is arranged on the front and back side of the device. On the one hand, it is possible to display larger portions of result lists in this way. But the screens can also be assigned different functions, e.g., the display of two different searches or the display of a search result on one screen and a written text on the second screen. A second screen, furthermore, is advantageous when several people want to look

at the screen at the same time. If the search result is displayed on both screens at the same time, several people can look at the screen from different positions.

In one advantageous embodiment of the invention, a wheel is additionally formed on the housing for moving the screen contents. This facilitates the reading of the search results or the scrolling in written text.

Preferably, the text of the search terms entered by means of the Morse symbols is visible on the screen in the top line. Thus, the user has direct control over his symbols entered, making possible a correction if necessary.

Preferably the mass storage is arranged in a portable storage unit. Entry by means of a Morse key is especially space-saving for portable devices, which need to be as small and handy as possible. Thanks to the entry by means of a single key unit, a portable device does not have to be set down on a surface in order to be used.

In the following, two exemplary embodiments of the invention will be explained in detail with reference to the drawings:

Figure 1 is a front view of an exemplary embodiment of the invention and

Figure 2 is a front view of an alternative exemplary embodiment of the invention.

Figure 1 shows a portable storage unit with a housing 10, in which a mass storage is arranged, on which a large quantity of data, such as pieces of music, video transmissions, photos and text files are saved. At the two long sides 14 and 16 of the housing 10 there is arranged one key 20 and 22 each, so that the keys 20 and 22 can be easily operated with the thumb and index finger of one hand, when the housing 10 lies with the front side 12 or the back side 18 in the palm of the user's hand.

The keys 20 and 22 are fashioned as Morse keys, while the key 20 is used to enter text, such as search terms or key words for a text being processed, and the second key 22 is used to enter control commands for the mass storage.

On the front side 12 and back side 18 there is arranged a screen 30, extending over nearly the entire surface of the front side 12 and back side 18.

On one of the two long sides 14 and 16 is arranged a wheel 24, by which the content of the screens 30 can be moved.

Furthermore, at the long side 16 there is arranged a socket 26 for connection of a head-

phone.

One possible use of the device by a user will be described hereinbelow.

If no separate button is present for turning the device on and off, the user can turn on the device by typing the term "on" using the key 22. He would now like to scroll through the available pieces of music by titles of the Beatles. For this, he first uses the key 22 to type the terms "search music pieces." On the screen 30 appears the entire list of all the stored pieces of music. If several identical devices are within range of the device of the user, it is possible by means of a wireless interface to exchange data between the two devices so that all the freely available data of the one device is displayed in the list of the other device. Such data from other devices is specially marked in the list, so that the user can copy the corresponding data onto his own hard disk, if required.

With the key 20, the user now enters the sequence of letters "BEA." Alternatively, he could also enter "Beatles," "BTLS" or "BTS." The sequence "BEA" appears in the top line of the screen 30. The pieces of music are now searched to find the sequence of letters "BEA," whether in the title, performer, or other information about the pieces of music. Since this sequence of letters occurs in particular in the word "Beatles," the titles of the Beatles and possibly other titles will go to the head of the list of available pieces of music. The user hears through the headphone the announcement "25" and knows that a total of 25 titles have been found containing the combination of letters "BEA." Alternatively, the entry key unit can also be used as mechanical output unit as it moves in an appropriate rhythm while the user lightly places his finger on it in order to feel the movement of the key.

By using the wheel 24, the user can now choose which pieces of music in the list of results he would like to listen to. Once the desired title is selected, he can start the piece of music by typing the term "play" using the key 22.

While the piece of music is playing, the user would like to view some photos. For this, he first uses the key 22 to type "search photos." With the key 20 he enters "vacation 2000" as the search term and receives a list of corresponding picture files. Using the wheel 24 he can select one of the photos and, after entering a term such as "view" or "enter" with the key 22, the desired picture appears on the screen 30. As an alternative, the wheel 24 can likewise be provided

with a print function¹, which replaces the “enter function.”

The desired photo will be displayed on both screens 30, so that a person sitting opposite the user can likewise view the photo. After the first piece of music stops, the user would like to listen to a piece of music whose melody he knows, but not the title or performer. Using the key 22, he enters “search music rhythms” and then uses key 20 to enter the rhythm of the melody of the piece. The list of results shows two hits, the first of which he selects by entering “Play” with the key 22.

In order to make the device unusable by third parties if lost, or especially stolen, the entering of a password can be requested after the user turns on the device. The passwords are to be entered using the key 20 and can consist either of a Morse term, a combination of letters and/or numbers, or a rhythm from a piece of music. Since the Morse characteristics of different users can have substantial deviations, the device is able to recognize the user by means of the pattern of Morse symbols. This offers an additional protection when the device is lost, since a third party with significantly different Morse characteristic than the proper user will not be authorized as user, even when entering the correct password.

Protection by means of a code or password which can be entered by means of Morse symbols or Morse-like symbols via a single key is especially space-saving, so that it can be used not only for small portable mass storages, but also generally for small portable devices not having any key pad, such as cameras or video cameras.

Figure 2 shows a portable storage unit to implement the alternative method of the invention, with a housing 40, in which a mass storage is arranged, on which a large quantity of data, such as pieces of music, video transmissions, photos, and text files are saved. On one of the two long sides 44 and 46 of the housing 40, in this case the long side 46, is provided a key 50, such that the key 50 can be easily operated with the thumb and index finger of one hand when the housing 40 lies with its back side 48 or front side 42 in the palm of the user's hand.

The key 50 is fashioned as a Morse key, and the key 50 is used to enter text, such as search terms or key words for a text being processed, when performing a search.

On the front side 42 and back side 48 there is arranged a screen 60, extending over nearly

¹ German *Druckfunktion* could also mean “pressing function” but “print function” seems more likely in context. Translator.

the entire surface of the front side 42 and back side 48.

On one of the two long sides 44 and 46 is arranged a wheel 54, by which the content of the screens 60 can be moved.

Furthermore, at the long side 46 there is arranged a socket 56 for connection of a head-phone.

One possible use of the device by a user will be described hereinbelow.

The user would like to search through the music pieces available in the mass storage by Beatles titles. The entire list of all the stored music pieces appears on the screen 60.

Using the key 50, the user first enters by Morse symbols the letter "B." On the first line of the screen, the letter "B" appears. At the same time, the list presented on the screen changes in that all the pieces of music whose title, performer, or other information contains a "B" are moved to the head of the list, while pieces of music whose title, performer or other information contains no "B" are moved to the end of the list. Alternatively, the pieces of music whose title, performer, or other information contains no "B" are entirely hidden from the list, so that the list becomes shorter with each further entry of additional letters or search terms.

In the majority of cases, the selection of data by entering a single letter will not yet be sufficiently restricted, especially when several hundred or thousand pieces of music are saved in the mass storage. Using the wheel 54, the screen contents can be shifted so that even long lists of search results can be scrolled through.

The user additionally enters with the key 50 the letters "E" and "A," so that the sequence of letters "BEA" now appears in the first line of the screen 60. Alternatively, he could also enter "Beatles," "BTLS" or "BTS." The pieces of music are now searched through and sorted to see whether the sequence of letters "BEA," whether in the title, performer, or other information about the pieces of music is found. Since this sequence of letters occurs in particular in the word "Beatles," the titles of the Beatles and possibly other titles will go to the head of the list of available pieces of music. The user hears through the headphone the announcement "25" and knows that a total of 25 titles have been found containing the combination of letters "BEA." Alternatively, the entry key unit can also be used as mechanical output unit as it moves in an appropriate rhythm while the user lightly places his finger on it in order to feel the movement of the key.

By using the wheel 24, the user can now choose which pieces of music in the list of re-

sults he would like to listen to. For this, the wheel 24 can be fitted with a print function² which realizes the “Enter function.”

The entry of commands can be done via a second Morse key as described in the first exemplary embodiment of the invention or by any known control device based on keys, such as a key pad similar to familiar mobile telephone key pads.

In addition, another key could be used in another entry mode to enter Morse symbols for simultaneous performance of a second search on the screen 60 located on the back side 48. Again, it is possible to combine either just the keys for entry of Morse symbols or also all the keys into a key unit.

The key unit can be fashioned as a wheel, which locks in a number of positions corresponding to the number of entry modes, and in each position one can enter Morse symbols or Morse-like symbols. Furthermore, the key unit can be fashioned as a turning knob or sliding controller, which locks into several positions, and again in each position one can enter Morse symbols or Morse-like symbols. It is also possible to enter several entry modes in one locked position, and one can switch between the different entry modes by typing in a certain code. Furthermore, the key unit can have one or two keys for entry of Morse symbols or Morse-like symbols to perform the search on one or two screens and a key pad similar to familiar mobile telephone key pads.

Since the Morse characteristics of different users can have substantial deviations, the device is able to recognize the user by means of the pattern of Morse symbols. This offers additional protection when the device is lost, since a third party with significantly different Morse characteristic than the proper user will not be authorized as the user.

² German *Druckfunktion* could also mean “pressing function” but “print function” seems more likely in context. Translator.

List of Reference Symbols

10 Housing
12 Front side
14 Long side
16 Long side
18 Back side

20 Key
22 Key
24 Wheel
26 Socket

30 Screen

40 Housing
42 Front side
44 Long side
46 Long side
48 Back side

50 Key
54 Wheel
56 Socket

60 Screen